GATE OR DOOR FRAME ASSEMBLY AND METHOD OF MAKING A GATE OR DOOR

FIELD OF THE INVENTION

The present invention relates to a frame assembly for use in the construction of gates or doors and, more specifically, to a frame assembly adapted to provide the vertical and horizontal support members of a gate or door and rotatably connect these members to a fixed structural member.

BACKGROUND OF THE INVENTION

Gates are used to allow selective access through a wall or fence. Conventionally, gates are constructed as follows. Two vertical support members and two horizontal support members are fastened together in a rectangular shape to form what will be referred to herein as a gate frame. Fence boards or the like are fastened to the support members, and one of the vertical support members is typically attached by tow or more hinge assemblies to a structural member such as a wall or post. Doors are similarly constructed with vertical and horizontal support members fastened together to form what will be referred to herein as a door frame. A sheet of plywood or the like covers one or both sides of the door frame.

Using conventional gate/door building techniques, fasteners such as nails or screws are driven through one support member into another support member to form the corners of the gate box. Over time, the force of gravity and wood shrinkage will cause these fasteners to loosen, allowing the gate/door frame to sag out of its desired rectangular shape.

Accordingly, metal L-brackets, wooden brace members, triangular pieces of plywood, and the like are often fastened to the adjacent ends of the support members to strengthen the inside corners of the gate/door frame. In other situations, a wire is placed in tension between the upper proximal and lower distal corners of the gate/door frame to support the lower distal corner of the gate frame and thereby reduce sagging of the gate or door. Such bracing techniques are somewhat effective but the wire is aesthetically unappealing and can produce frayed ends which are potentially dangerous. In addition the bracing commonly employs fasteners that are susceptible to failure and it can be relatively time consuming to implement.

Another problem with conventional gate/door building techniques is that fasteners such as nails or screws are similarly used to attach the hinge assemblies to the vertical support member adjacent to the structural member. The loads are transferred to the gate/door through the screws placed in tension. As the wood shrinks and the gate/door is opened and closed, the fasteners under tension tend to loosen and may eventually fail.

As the hinge fasteners loosen, the entire gate/door assembly may sag relative to the hinge assemblies and the structural members, even if the gate/door frame maintains its rectangular shape. The use of braces at the corners of the gate/door frame will worsen sagging at the hinges because the materials and hardware used for bracing increase the weight of the gate/door; this increased weight increases the forces of gravity on the fasteners used to attach the hinge assemblies to the proximal vertical support member.

Various solutions have been proposed. One attempt was a steel gate frame product comprising distal and proximal brace members, with hinges being attached to the proximal brace member. A gate assembly constructed using this

product would use upper and lower horizontal wooden support members, but would not use vertical support members. Instead, the distal and proximal brace members would form the structure of the vertical sides, with each size corresponding to a given distance between the upper and lower horizontal support members. The finished gate has excessive flex along the vertical plane of the gate. This flexing can cause the gate to twist making installation difficult. Exposed metal bracing are subject to rust and are aesthetically unattractive.

Another proposed solution was a set of four metal brackets as shown in Canadian Industrial Design Registration No. 83049 and No. 83050. These registrations describe a bracket system for forming gate assemblies. Four separate brace members are provided, and two of the brace members are rigidly attached to hinge assemblies. The brace members are adapted to be attached to support members to form the corners of a gate frame functioning as the structural portion of the gate assembly. The hinge assemblies are adapted to be rigidly attached to a fence post to allow the gate assembly to pivot relative to the fence post. Gate assemblies of arbitrary height and width can be formed using this bracket system although wooden members must be trimmed to accommodate weld filets of the brackets. As there is no direct connection between the horizontal and vertical wooden support members that can over time twist and warp independently of each other. While the finished gate is extremely rigid, light weight and flex resistant, exposed metal bracing and parts are subject to rust and are unattractive. Costs of manufacture, quality control at welded connections and shipping costs are additional problems associated with this product.

From the foregoing, it should be clear that one object of the present invention is to develop a method and frame for making a gate or door that is easy and

inexpensive to use, and which allow significant flexibility in the final design of the gate or door assembly.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a frame for making a gate or door that is extremely rigid, light weight, flex resistant and with a minimum of exposed metal bracing and parts.

A further object of the present invention is to provide a frame for making a gate or door with improved method of securing the hinges to the frame.

Thus in accordance with the present invention there is provided a frame assembly for making a gate or door comprising an upper horizontal member, a lower horizontal member, a first vertical member and a second vertical member, one or more cylindrical members provided along the length of each of the upper and lower horizontal members, first connection means to connect an upper end of the first vertical to one end of cylindrical member, second connection means to connect lower end of the first vertical member to one end of cylindrical member, third connection means to connect an upper end of the second vertical member to a second end of cylindrical member and fourth connection means to connect a lower end of the second vertical member to a second end of cylindrical member.

There is also provided in accordance with the present invention a kit for making a frame assembly for making a gate or door to fit a rough opening comprising upper and lower horizontal members sized to permit them to be cut to fit rough opening width, two vertical members sized to permit them to be cut to fit rough opening height, one or more cylindrical members provided along the length of each of the upper and lower horizontal members, connection means to connect

the ends of the vertical members to the ends of the cylindrical members provided along the length of the upper and lower horizontal members and two or more hinges.

Further features of the invention will be described or will become apparent in the course of the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are shown in the drawings, wherein:

Figure 1 is a perspective view of an assembly drawing for a frame assembly for making a gate or door in accordance with the present invention.

Figure 2 is a front plan view of the horizontal and vertical members of the frame assembly of Figure 1.

Figure 3 is an enlarged view of a hinge attachment detail of the frame assembly of Figure 1.

Figure 4 is an enlarged perspective view of a portion of a horizontal member of Figure 3 with a channel to accept a cylindrical member.

Figure 5 is an end plan view of the horizontal member of Figure 4 with the cylindrical member in place ready to receive the support rod.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to Figures 1 to 5, generally one embodiment of a frame assembly for making a gate or door in accordance with the present invention is generally

indicated at 1. The frame assembly comprises an upper horizontal member 2, a lower horizontal member 3, a first vertical member 4 and a second vertical member 5. In the preferred embodiment illustrated when assembled, the horizontal 2, 3 and vertical 4, 5 members form a rectangular frame.

In the embodiment shown support rods 6, 7 are provided for connecting the upper horizontal member 2 with first and second vertical members 4, 5. The support rods preferably are steel rods with a cross section of at least 1/4 inch. In order to connect the support rods 6, 7 to the upper horizontal member 2 so that it is strengthened against sagging, a longitudinal hole or channel 8 is provided along the length of the upper horizontal member 2 for receiving a cylindrical member 10. The hole or channel 8 can be drilled, grooved or provided in some other manner. In the embodiment shown, channel 8 is formed by making a groove a third of the thickness of the upper horizontal member 2 in the lower section 9 of said horizontal member 2 along its length. In the embodiment shown the upper and lower horizontal members 2, 3 have nominal dimensions of 1.5 x 3.5 x 24 inches. In the case where a channel 8 is provided, and not a hole, means for securely positioning the cylindrical member 10 within said channel 8 are provided. Hole or channel 8 is sized and shaped to permit cylindrical member 10 to pass through it. The combination support rod and cylindrical member are defined herein as the support member.

Other materials and dimensions for the support member are possible so long as it provides the necessary support to the frame assembly. Alternatively, one or more support members can be provided along the length of each of the upper and lower horizontal members 2, 3 to further strengthen the resulting frame and prevent sagging.

The lower horizontal member 3 is similarly provided with a channel 8 and support rods 6, 7.

Connection means i.e. the support rods which serve a double purpose are provided to connect the upper and lower ends of the first and second vertical members 4, 5 to opposite ends of the cylindrical members provided along the length of the upper and lower horizontal members 2, 3.

The upper end of vertical member 4 is provided with at least one horizontal hole 14 sized and located to permit support rod 6 to pass through. If a second support rod is provided in upper horizontal member 2, a second horizontal hole can be located in the upper end of vertical member 4 to permit the second rod to pass through. The upper end of vertical member 5 is similarly provided with at least one horizontal hole sized and located to permit support rod 7 to pass through. If a second support rod is provided in upper horizontal member 2, a second horizontal hole can be located in the upper end of vertical member 5 to permit the second rod to pass through.

Similarly, the lower ends of vertical members 4, 5 are provided with at least one horizontal hole sized and located to permit support rods to pass through. In the preferred embodiment a plurality of horizontal holes can be provided in the lower ends at six inch intervals to permit the length of vertical members 4, 5 to be adjusted to accommodate different sizes of frame assembly.

The present invention also provides for easy adjusting of the width of the frame assembly. By providing a cylindrical member 10 to a standard length of 24 inches, for instance, considering that a narrower frame is quite rare and not that useful, it can be seen that the horizontal members 2, 3 can be longer and yet cut to length without having to do the same with the cylindrical member 10. Once the horizontal member is cut to one's desired length, the cylindrical member 10 can easily be reinserted in said horizontal member for secured positioning therein before accepting the support rods.

In order to assemble the frame assembly 1 for making a gate or door in accordance with the present invention, the upper and lower horizontal members 2, 3 are cut to the desired length based on the width of the desired gate or door. Usually the width of the opening is measured ("rough opening") and the width of the finished frame assembly is calculated at one inch narrower than the rough opening. The length of the horizontal members 2, 3 and the width of the two vertical support members 4, 5 should equal one inch narrower than the rough opening. For example, where the vertical support members are made from 2 x 4 lumber having nominal dimensions of 1.5 x 3.5 inches, the horizontal members 2, 3 are cut eight inches narrower than the rough opening. Similarly, the first and second vertical members 4, 5 are cut to the desired length based on the height of the desired gate or door. Typically, this desired height is height of the fence or door opening less clearance required at the bottom to permit the gate or door to open and close. The vertical members 4, 5, as noted, are preferably predrilled with horizontal holes at six inch intervals to accommodate various sizes of gates. In the preferred embodiment the frame assembly is designed to build gates or doors from three feet to six feet high, the normal maximum required. Anything shorter than three feet typically does not require the added strength provide by the present invention. If a gate of a height that does not meet the predrilled holes, for example a gate fifty two inches high, the verticals can be cut using the holes drilled at forty eight inches and the fence boards can hang down below the lower horizontal support member.

Discussing the upper section of frame 1, cylindrical member 10 is securely positioned either in the channel or hole 8 of the horizontal member 2 and is at least partially threaded for reciprocally receiving a threaded support rod 6.

On the hinged side of the frame 1, support rod 6 is inserted first through hole 11 of hinge 12 then in hole 13 of upper end of vertical member 4. Support rod 6 is now abutting cylindrical member 10 which is positioned into the horizontal member 2 and ready to be screwed into cylindrical member 10. End of support rod 6 is tapered and therefore will not affect the performance of the hinged frame when in use as it forms a snug fit.

At the other end of horizontal member 2, support rod 7 is first inserted through hole 14 of upper end of vertical member 5 then screwed into cylindrical member 10 thereby forming the upper section of the frame 1. It will be obvious to someone skilled in the art that the bottom section of frame 1 can now be constructed as discussed above.

It will be understood that by having the support rods 6, 7 of equal length that once screwed into the cylindrical member 10 said member 10 will be centered relative to horizontal member 2 therefore providing equal support throughout for optimum performance. As well, the combination of support rods and cylindrical member provides for flexibility and ease of use when it comes to adjusting the size of the frame.

The hinges can then be attached to a fixed structural member such as a fence post or door jamb. The hinges can be located to have the gate swing in or out and a left or right opening gate or door.

Once the frame assembly is complete fence boards or facing material can be fastened to one or both sides of the frame assembly to complete the gate or door. Braces can optionally be provided, if desired, in the inside corners of the assembled frame assembly 1 to provide additional rigidity.

The frame assembly is preferably provided as a complete kit to build a gate frame or door frame including all hardware and structural members. One kit can build any normal sized gate or door. The present invention does not depend on steel brackets to provide strength but rather the support rods and cylindrical member combinations that run through the structural members and used to tie the whole frame assembly together. The present invention provides an extremely strong gate or door with no exposed steel parts to rust or corrode other than the hinges.

The design of the present invention is easier to use than the prior art bracket systems and builds a superior gate that will not twist or warp as is common due to the use of fencing lumber which is green (not kiln dried). The present invention can be used with horizontal and vertical members of different sizes and materials (including composite materials) without departing from the scope of the present invention.

In addition to garden or fence gates the present invention can be used to build odd sized doors for garden and storage sheds, cold cellars, basements, storage lockers or other applications that require a custom size of door.

Although various preferred embodiments of the present invention have been described herein in detail, it will be appreciated by those skilled in the art, that variations may be made thereto without departing from the spirit of the invention or the scope of the appended claims.